

Listing of Claims

Claims 1-43 (canceled)

Claim 44 (new). An optical module for a high-speed bidirectional transceiver having a first optical path and a second optical path for transmitting optical beams in mutually opposite directions comprising:

 a housing having a longitudinal member with a top surface and a bottom surface;
 a first cavity disposed in said longitudinal member shaped for mounting a first optical device;

 a second cavity disposed in said longitudinal member and spaced apart from said first cavity shaped for mounting a second optical device;

 an optical signal generating unit disposed in said first cavity, said optical signal generating unit including a laser diode and a first collimating lens unit for generating a collimated outgoing beam having a first wavelength from a first opening in said top surface;

 an optical signal receiving unit disposed in said second cavity, said optical signal receiving unit including an optical detector receiving light from a second opening in said top surface;

 an optical fiber connection unit disposed at one end of said longitudinal member and spaced apart from said first cavity and said second cavity, said optical fiber connection unit having a second collimating lens unit collimating light received from an optical fiber at a second wavelength into an incoming beam and receiving said collimated outgoing beam;

 a first mirror reflective at said first wavelength disposed above said top surface of said member proximate said first opening for redirecting said collimated outgoing beam

to a direction parallel to said top surface directed towards said second collimating lens unit; and

a second mirror reflective at said second wavelength disposed above said top surface proximate said second opening for redirecting said collimated incoming beam to said optical signal receiving unit;

wherein said collimated outgoing beam has a substantially constant cross-section from said first mirror to said optical fiber connection unit to facilitate independent fine alignment of said laser diode and said optical detector; and

wherein said housing is adapted for said laser diode and said optical detector to be electrically coupled to a printed circuit board with an inductance sufficiently low to permit data rates of at least about one Gigabit/second.

Claim 45 (new). The optical module of claim 44, wherein said first collimating lens unit is a collimating optical objective comprised of at least one circular aspherical lens.

Claim 46 (new). The optical module of claim 44, wherein said first collimating lens unit is a collimating anamorphic objective comprised of at least two mutually perpendicular cylindrical lenses.

Claim 47 (new). The optical module of claim 44, wherein said first collimating lens unit is a collimating optical objective comprised of at one circular aspherical lens.

Claim 48 (new). The optical module of claim 9, wherein said first collimating lens unit is a collimating anamorphic objective comprised of at least two mutually perpendicular cylindrical lenses.

Claim 49 (new). The optical module of claim 44, wherein said optical fiber connection unit is a pre-assembled unit comprising said second collimating lens unit, an optical fiber holder, a spacer between said second collimating lens unit and said optical fiber holder, and an optical fiber, said spacer being sandwiched between said second collimating lens unit and said optical fiber holder, said fiber having a core but coupled to said spacer.

Claim 50 (new). An optical module for a high-speed bidirectional transceiver, comprising:

 a housing having a longitudinal member with a top surface and a bottom surface;
 a first cavity disposed in said longitudinal member shaped for mounting a first optical device;
 a second cavity disposed in said longitudinal member and spaced apart from said first cavity shaped for mounting a second optical device;
 an optical signal generating unit disposed in said first cavity, said optical signal generating unit including a laser diode and a first collimating lens unit for generating a collimated outgoing beam having a first wavelength from a first opening in said top surface;

an optical signal receiving unit disposed in said second cavity, said optical signal receiving unit including an optical detector for receiving light from a second opening in said top surface;

an optical fiber connection unit attached to one end of said longitudinal member and spaced apart from said first cavity and said second cavity, said optical fiber connection unit having a second collimating lens unit held in optical alignment with an optical fiber to couple incoming and outgoing light between said optical fiber and said optical module, said second collimating lens unit collimating incoming light received from said optical fiber at a second wavelength to generate a collimated incoming beam;

a first mirror reflective at said first wavelength disposed above said top surface proximate said first opening for redirecting said collimated outgoing beam to a direction parallel to said top surface directed towards said second collimating lens unit; and

a second mirror reflective at said second wavelength disposed above said top surface for redirecting said collimated incoming beam to said optical signal receiving unit;

wherein said collimated outgoing beam has a substantially constant cross-section from said first mirror to said optical fiber connection unit and said collimated incoming beam has a substantially constant cross-section from said second optical collimating unit to said second mirror; and

wherein said first collimating lens unit and said second collimating lens unit are selected such that said collimated incoming beam and said collimated outgoing beam facilitate independent fine optical alignment of said laser diode, said optical detector, and said optical fiber connection unit.

Claim 51 (new). The optical module of claim 50, wherein said housing is adapted for said laser diode and said optical detector to be electrically coupled to a printed circuit board with an inductance sufficiently low to permit data rates of at least about 1 Gigabits/second.

Claim 52 (new). The optical module of claim 50, wherein said optical fiber connection unit includes an optically transparent spacer sandwiched between said second collimating lens unit and an optical fiber holder, wherein an optical fiber butt coupled to said transparent spacer.

Claim 53 (new). The optical module of claim 50, wherein said optical fiber connection unit includes a ferrule for holding an optical fiber and an optically transparent spacer sandwiched between said second collimating lens unit and said ferrule.

Claim 54 (new). An optical module for a high-speed bidirectional transceiver, comprising:

- a housing having a longitudinal member with a top surface and a bottom surface;
- a first cavity disposed in said longitudinal member shaped for mounting a first optical device;

- a second cavity disposed in said longitudinal member and spaced apart from said first cavity shaped for mounting a second optical device;

- an optical signal generating unit disposed in said first cavity, said optical signal generating unit including a laser diode and a first collimating lens unit for generating a

collimated outgoing beam having a first wavelength from a first opening in said top surface;

an optical signal receiving unit disposed in said second cavity, said optical signal receiving unit including an optical detector for receiving light from a second opening in said top surface;

a pre-assembled optical fiber connection unit attached to one end of said longitudinal member, said pre-assembled optical fiber connection unit having a second collimating lens unit held in optical alignment with an optical fiber to couple incoming and outgoing light between said optical fiber and said optical module, said second collimating lens unit collimating incoming light received from said optical fiber at a second wavelength to generate a collimated incoming beam;

a first mirror reflective at said first wavelength disposed above said top surface proximate said first opening for redirecting said collimated outgoing beam to a direction parallel to said top surface directed towards said second collimating lens unit; and

a second mirror reflective at said second wavelength disposed above said top surface proximate said second opening for redirecting said collimated incoming beam to said optical signal receiving unit;

wherein said outgoing beam has a substantially constant cross-section from said first mirror to said optical fiber connection unit and said incoming beam has a substantially constant cross-section from said second optical collimating unit to said second mirror; and

wherein said first collimating lens unit and said second collimating lens unit are selected such that said collimated incoming beam and said collimated outgoing beam

facilitate independent fine optical alignment of said laser diode, said optical detector, and said pre-assembled optical fiber connection unit.

Claim 55 (new). The optical module of claim 54, wherein said housing is adapted for said laser diode and said optical detector to be electrically coupled to a printed circuit board with an inductance sufficiently low to permit data rates of at least about one Gigabit/second.